Tropical Cyclone Positioning



The Process

1. Use available Vis, IR, Microwave, AScat, Radar, Obs

USE **ALL** SOURCES OF INFORMATION

2. Combine these positions and compare with expected position from previous fixes and forecast location to get an estimate at the required analysis time.

If required make adjustments to previous fixes.

3. Determine uncertainty and movement.

From Dvorak (1985):

"The cloud system center is defined as the focal point of all the curved lines or bands of the cloud system.

It can also be thought of as the point toward which the curved lines merge or spiral."







Or Difficult – blob on IR (at night)

Australian Government

Bureau of Meteorology



Uncertainty >30nm



Australian Government

Bureau of Meteorology

Exposed Low Level Circulation Centre (LLCC)



Eye pattern Accuracy ~10nm

Shear pattern Accuracy ~10nm

Exposed Low Level Circulation Centre (LLCC)

VIS (easier) Vs IR

Australian Government Bureau of Meteorology





Bureau of Meteorology

Exposed Low Level Circulation Centre (LLCC)

Partial Exposure Where is the centre?

What is the shear?



TC Sam Dec 2000 Southern Hemisphere Example





Southern Hemisphere Example



Modelled Cloud Centre

Australian Government

Bureau of Meteorology





Overshooting tops: where is the centre?

Australian Government

Bureau of Meteorology

Must consider shear : moderate easterly





TC Sean 2010 Southern Hemisphere



Compare Centre location with forecast

Australian Government Bureau of Meteorology



Southern Hemisphere Example

Australian Government Bureau of Meteorology Compare Centre location with previous

(Use animation)

three hours later



Southern Hemisphere Examples



Observations

Change in winds & pressures



Hamish March 2009



Observations

Change in winds & pressures



Lua March 2012



Uncertainty and movement

1. Analysis fix accuracy

Position Code Number (PCN)	Suggested Analysis Fix Accuracy (nm)	
eye visible on radar	5-10	
eye visible on satellite	15	Good
well-defined circulation	15-20	
(radar or 37GHz microwave)		
well-defined circulation (satellite)	20-25	
well-defined circulation (surface)	25-30	
poorly-defined circulation (radar)	30-40	Fair
poorly-defined circulation (satellite)	30-65	
poorly-defined circulation (surface)	40-65	Poor

Also consider:

Speed of movement – fast moving TCs have a higher uncertainty than a slow moving one.

 Parallax for systems distant from satellite position (140°E MTSAT) or distant from radar or on microwave.

Differences between LLCC and higher centre for tilted vortex when viewing mid-high cloud/convection.

Time of images relative to analysis time especially for fast moving systems.

Resolution and timeliness of microwave imagery and potential satellite navigation error.

Exercises: Marcia Where would you put the centre? What other information would help?





Exercises: Marcia Where would you put the centre? What other information would help?







